

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently amended): A dry etching process ~~for producing vertical sidewalls in X and Y crystalline directions along a compound semiconductor material having a variable thickness~~ for a semiconductor wafer having variable thickness comprising the steps of:

- 5 placing in a chamber said semiconductor wafer having on one side a said compound semiconductor material ~~having with~~ an exposed portion and on the opposing side a metal layer;
- releasing an halogen etchant into said chamber;
- adding a nitrogen gas to said chamber;
- 10 heating said compound semiconductor material;
- applying pressure to said halogen etchant and said nitrogen gas;
- applying a bias power and a pulse-modulated power to said halogen etchant and said nitrogen gas; and
- 15 continuing the dry etching process until a desired via-hole is selectively etched in ~~limited to the compound semiconductor material is achieved to produce vertical sidewalls in~~ X and Y crystalline directions therein without punch-through of the metal layer.

Claim 2 (Previously presented): A dry etching process as recited in Claim 1 wherein said compound semiconductor material has an etch rate that is within a range of approximately 70 times to approximately 80 times faster than said etch rate of a front-side metal layer on said compound semiconductor material.

Claim 3 (Previously presented): A dry etching process as recited in Claim 1, wherein said chamber contains by volume not less than 10 parts halogen etchant to 1 part said nitrogen gas.

Claim 4 (Previously presented): A dry etching process as recited in Claim 3, wherein said halogen etchant is one selected from the group consisting of Chlorine, Fluorine and Bromine.

Claim 5 (Previously presented): A dry etching process as recited in Claim 3, wherein said halogen etchant is one selected from the group consisting of Hydrogen Bromide and Hydrogen Iodide.

Claim 6 (Previously presented): A dry etching process as recited in Claim 1, wherein said halogen etchant is Hydrogen Bromide.

Claim 7 (Previously presented): A dry etching process as recited in Claim 1, wherein said compound semiconductor material is selected from a group consisting of Gallium Arsenide and Indium Phosphide.

Claim 8 (Previously presented): A dry etching process as recited in Claim 1, wherein said volume ratio of said halogen etchant to said nitrogen gas is selected from a range of approximately 10:1 to approximately 13:1.

Claim 9 (Previously presented): A dry etching process as recited in Claim 1, wherein said heating step comprises applying a temperature to said halogen etchant and said nitrogen gas selected from a range of approximately 130 degrees C to approximately 170 degrees C.

Claim 10 (Previously presented): A dry etching process as recited in Claim 1, wherein applied pressure of said halogen etchant and said nitrogen gas is selected from a range of approximately 5 milli-Torr to approximately 20 milli-Torr.

Claim 11 (Previously presented): A dry etching process as recited in Claim 1, wherein said bias power step comprises introducing a bias power to said semiconductor material selected from a range of approximately 20 Watts to approximately 50 Watts.

Claim 12 (Previously presented): A dry etching process as recited in Claim 1, wherein said pulse-modulated power step comprises applying an inductively coupled plasma power to said compound semiconductor material selected from a range of approximately 350 Watts to approximately 750 Watts.

Claim 13 (Previously presented): A dry etching process as recited in Claim 1, wherein a non-exposed portion of said semiconductor wafer is not damaged during said etching process.

Claim 14 (Previously presented): A dry etching process as recited in Claim 1, wherein said addition of said nitrogen gas to said halogen etchant reduces said etch rate of said front-side metal layer by more than 90 percent.

Claim 15 (Withdrawn): A dry etchant for a compound semiconductor material comprising:

a halogen etchant; and

a nitrogen gas, wherein a volume ratio of said halogen etchant to said nitrogen gas is greater than 10:1.

Claim 16 (Withdrawn): A dry etchant as recited in Claim 15, wherein said halogen etchant is selected from a group consisting of Chlorine, Fluorine, Bromine and Iodide.

Claim 17 (Withdrawn): A dry etching as recited in Claim 15, wherein said halogen-comprising compound is selected from a group consisting of Hydrogen Bromide, Hydrogen Iodide and Hydrogen Chloride.

Claim 18 (Currently amended): A dry etching process ~~for producing vertical sidewalls in X and Y crystalline directions for a compound semiconductor material having a variable thickness for a semiconductor wafer comprising~~ the steps of:

5 placing in a chamber said semiconductor wafer having on one side a ~~said~~ compound
semiconductor material with ~~having~~ an exposed portion and on the opposing side a metal
layer;

releasing a halogen etchant into said chamber;

adding nitrogen gas to said chamber;

heating said compound semiconductor material;

10 applying a bias power and an inductively coupled plasma power to said halogen
etchant and said nitrogen gas; and

continuing the dry etching process until the desired via-hole is selectively etched in
limited to the compound semiconductor material is achieved;

15 thereby producing vertical sidewalls in X and Y crystalline directions for a compound
semiconductor material having a variable thickness without punch-through of the metal
layer.

Claim 19 (Previously presented): The method of Claim 18 wherein said dry etch
process has an etch rate within a range of approximately 70 times to approximately 80
times faster than said etch rate of a front-side metal layer disposed on said compound
semiconductor material.

Claim 20 (Previously presented): The method of claim 18 wherein said halogen
etchant to said nitrogen gas volume ratio is selected from a range of approximately 10:1 to
approximately 12:1.